CLAIMS:

[cl 1] A method for manufacturing methanol and acetic acid, characterized by the integrated steps of:

separating a hydrocarbon source into first and second hydrocarbon streams;

steam reforming the first hydrocarbon stream with steam to produce a reformed stream;

autothermal reforming of a mixture of the reformed stream and the second hydrocarbon stream with oxygen and carbon dioxide to produce a syngas stream;

separating a minor portion of the syngas stream into a carbon dioxide-rich stream, a hydrogen-rich stream, and a carbon monoxide-rich stream;

recycling the carbon dioxide-rich stream to the autothermal reforming;

compressing a remaining portion of the syngas stream, at least a portion of the hydrogen-rich stream to supply a makeup stream to a methanol synthesis loop to obtain a methanol product; and

synthesizing acetic acid from at least a portion of the methanol product and the carbon monoxide-rich stream.

[cl 2] The method of claim 1, wherein the makeup stream has an SN between 2.0 and 2.1.

[cl 3] The method of any one of the preceeding claims, further comprising supplying a purge gas stream from the methanol synthesis loop to the separation step.

[cl 4] The method of any one of the preceeding claims, wherein the autothermal reformer is a single train autothermal reformer.

[cl 5] The method of any one of the preceeding claims, wherein the separation step includes supplying the minor portion of the syngas to a methane wash cold box unit.

[cl 6] The method of claim 5, wherein a flash gas from the separation step is recycled to the methanol synthesis loop.

[cl 7] The method of any one of claims 5 or 6, wherein a tail gas stream from the cold box is recycled as feed gas.

[cl 8] The method of any one of the preceeding claims, wherein carbon dioxide emissions are less than 10% of the total carbon input.

[cl 9] The method of any one of claims 1-7, wherein carbon dioxide emissions are less than 5 percent of the total carbon input.

[cl 10] The method of any one of the preceeding claims, wherein a first portion of the hydrogen-rich stream from the separation step is recycled to the methanol synthesis loop and a second portion is sent as feed to an associated process.

[cl 11] The method of any one of the preceeding claims, further comprising supplying a carbon dioxide stream from an associated process to supply the makeup stream.

[cl 12] The method of any one of claims 10 or 11, wherein the associated process uses the acetic acid as a reactant, uses the methanol product as a reactant, shares oxygen from a common air separation unit, shares common utilities, or a combination thereof.

[cl 13] The method of any one of claims 10-12, further comprising:

providing at least a portion of the acetic acid produced to a vinyl acetate monomer synthesis loop in the associated process;

combining the portion of the acetic acid with an ethylene source and oxygen to produce vinyl acetate monomer.

[cl 14] The method of claim 13, wherein a single air separation unit supplies oxygen to the associated process and the autothermal reformer.

[cl 15] The method of any one of the preceeding claims, wherein at least 10% of the syngas stream is directed to the separation step.

[cl 16] The method of any one of the preceeding claims, wherein the methanol produced is between 1,000 and 30,000 tons/day.

[cl 17] The method of any one of the preceeding claims, wherein the acetic acid produced is between 500 and 6,000 metric tons/day.

[cl 18] The method of any preceding claim, further comprising importing a CO2-rich stream to the methanol synthesis loop.

[cl 19] The method of claim 13, further comprising importing a CO2-rich stream from the vinyl acetate monomer synthesis loop to the methanol synthesis loop.

[cl 20] The method of claim 18 or 19, wherein the hydrocarbon source comprises natural gas and a ratio of the imported CO2 stream to the hydrocarbon source is at least 0.05 kg CO2 per Nm3 natural gas.

[cl 21] The method of claim 20, wherein the ratio of the imported CO2 stream to the natural gas is at least 0.2 kg CO2 per Nm3 natural gas.

[cl 22] The method of claim 19, wherein the ratio of the imported CO2 to the natural gas is at least 0.23 kg CO2 per Nm3 natural gas.

[cl 23] The method of any one of the preceding claims, comprising:

diverting between 35 and 65% of the feed gas stream to the first stream; and

diverting between 35 and 65% of the feed gas stream to the second stream.

[cl 24] The method of any one of the preceding claims, comprising:

diverting 45 to 55% of the feed gas stream to the first stream; and

diverting 45 to 55% of the feed gas stream to the second stream.

[cl 25] The method of any preceding claim wherein the separation step produces a tail gas stream enriched in inerts.